AMENDMENTS TO THE SPECIFICATION:

Page 1, before line 1, add:

--**RELATED APPLICATION**

This is a divisional of our copending application 09/293,062 filed April 19, 1999.--

Please amend the paragraph beginning at page 1, line 5, as follows:

The present invention relates to magnetic resonance imaging for ~~obtaining~~ imaging blood vessels and tissue of a subject (patient) on the basis of a magnetic resonance phenomenon occurring in the subject. More particularly, this invention is concerned with a magnetic resonance imaging (MRI) system and magnetic resonance (MR) imaging method that provides tissue/blood contrast images of a higher quality.

Please amend the paragraph beginning at page 1, line 13, as follows:

In one aspect, such images are provided by utilizing MT (magnetization transfer) pulses that are able to greatly raise contrast between blood (or flow of blood) and tissue. In another aspect, such high-quality tissue/blood contrast images are obtained by acquiring a plurality of echo signals responding to one ~~piece of~~exciting pulse incorporated in a pulse sequence to which both a degree of resolution and a time for echo

acquisition are optimized. In this later case, a patient's breath hold is improved by using an easier self-navigation technique.

Please delete the paragraph beginning at page 1, line 24, which starts with "The term".

Please amend the paragraph beginning at page 2, line 6, as follows:

One field of~~the~~ magnetic resonance (MR) imaging ~~fields~~is MR angiography. A phase contrast method is one technique for ~~the~~MR angiography, which uses pulses referred to as flow encoding pulses. Another method for ~~the~~MR angiography is to utilize MT effects (or what may be referred to as MTC (magnetization transfer contrast effects) to produce images ~~in which~~to produce contrast between blood (flow of blood) and tissue ~~is given~~. Recently this ~~This~~ technique has frequently been used ~~lately~~. One such example is disclosed by United States Patent No. 5,050,609 (Magnetization Transfer Contrast and Proton Relaxation and Use thereof in Magnetic Resonance Imaging).

Please amend the paragraph beginning at page 2, line 25, as follows:

~~As~~Several conventional MR angiography techniques that use~~s~~ MT effects~~, there~~ are ~~proposed several techniques as~~discussed below.

Please amend the paragraph beginning at page 2, line 27, as follows:

In each of Figs. 1A to 1C, the left-side graph ~~is a~~represents the frequency ~~spectrum~~spectra of free water and macromolecules, while the right-side one illustrates the exchange and relaxation relation of their magnetizations Mr and Mf. As shown in the spectra of protons of free water and macromolecules, the free water of which T2 (spin-spin) relaxation time is longer (T2 is approx. 100 msec) and the macromolecules of which T2 relaxation time is shorter (T2 is approx. 0.1 to 0.2 msec) resonate in the same frequency range. Since the T2 relaxation time of a free water signal is longer, its Fourier-transformed signal has a peak ~~of which~~with a relatively narrow half-width ~~value is narrow~~, as shown ~~therein~~. However, in the case of the signal of protons whose movement is restricted among macromolecules, such as protein, its Fourier-transformed signal ~~show the~~exhibits a relatively broader half-width value, due to a shorter T2 relaxation time, no longer appearing as a distinct peak in the spectra.

Please amend the paragraph beginning at page 3, line 15, as follows:

When taking the resonance peak frequency f_o of free water as the center frequency, a frequency-selective pulse serving as an MT pulse is applied to excite a frequency range shifted, for example, by 500 Hz from the center frequency f_o of free water (that is, off-resonance excitation), as shown in the left side of Fig. 1B. This excitation causes the magnetization Hf of free water and those Hr of macromolecules, both of which are in equilibrium as shown in the right side of Fig. 1A, to change relative to one another as the magnetization Hf of free water moves to ~~those~~the Hr of

macromolecules as shown in the right side of Fig. 1B. As a result of it, as illustrated in the left-side graph of Fig. 1C, the signal value of protons of free water decreases. Differences in signal values are caused between one region in which the chemical exchanges and/or cross relaxation between free water and macromolecules are reflected and the other region in which such chemical exchanges and/or cross relaxation is not reflected. These differences lead to differences in contrast between flow of blood and tissue, providing blood flow images.

Please amend the paragraph beginning at page 4, line 6, as follows:

At present, ~~the~~MR angiography based on MT effects is classified into spatially non-selective imaging and slice-selective imaging.

Please amend the paragraph beginning at page 4, line 9, as follows:

As an example of the former, ~~known is~~"G.P.Pike, MRM 25, 327-379, 1992"~~, in which~~describes a frequency-selective binomial pulse ~~is~~used as the MT pulse and applied in ~~the~~a spatially non-selective manner. Contrast between parenchyma and flow of blood is obtained according to a relation of "MT effects of parenchyma > MT effects of flow of blood."

Please amend the paragraph beginning at page 4, line 16, as follows:

~~On one hand as,~~As an example ~~for~~of the latter imaging, ~~there~~is ~~proposed~~a proposal by "M. Miyazaki, MRM 32, 52-59, 1994." This paper teaches that a slice-selective MT pulse ~~is composed by~~uses an RF excitation pulse ~~of which~~having an application time that is relatively long and accompanied by gradient spoiler pulses. ~~And, application~~Application of such an MT pulse causes MR signals to be emanated from stationary parenchyma in a slice to be imaged to be lowered ~~largely~~more than in a flow of blood that passes therethrough, due to its MT effects. ~~as well as~~MT effects received by flow of blood that comes into the slice ~~to~~also cause a signal decease (but, the degrees~~s~~ of signal decrease ~~of~~from flow of blood ~~are~~is less than that ~~of~~from parenchyma). This provides contrast between flow of blood and parenchyma.

Please amend the paragraph beginning at page 4, line 29, as follows:

However, in the case of the foregoing MR angiography making use of ~~the~~a slice-selective MT pulse, blood flowing into a slice to be imaged suffers from a considerably large amount of MT effects, because a flip angle given to magnetization when the MT pulse is applied is set to a greater amount (for example, 500 to 1000 degrees). This results in ~~that~~ MR signals ~~value~~emanated from the blood passing the slice to significantly decrease ~~largely~~in magnitude. Therefore, contrast between blood and parenchyma is not always fully satisfied under recent needs for higher image resolution ~~of images~~.

Please amend the paragraph beginning at page 6, line 3, as follows:

On one hand, for depicting ~~the~~cardiac vascular systems, ~~the~~synchronization with the cardiac temporal phase, which is typically represented by an ECG signal, is unavoidable. In addition, field-echo-system pulse sequences whose repetition time TR and/or echo time TE are shortened are used for ~~the~~reduced scanning time in imaging ~~the~~cardiac vascular systems. Particularly, a segmented FFE (Fast FE) can raise a temporal efficiency for scanning, which has been used widely. In the FFE sequences, if the TR or TE is reduced, image contrast is lowered. Thus, to compensate for this lowered contrast, an MT pulse and/or fat-suppression pulse are preferably used. In addition, when considering the fact that three-dimensional imaging takes a long time for scanning, it is, in fact, impossible to force a patient to continue her ~~for~~or his breath hold for such a long scanning time. A continuous imaging is therefore executed in synchronism with an ECG signal. In this ECG-gating imaging, a problem arises in that the heart moves with its respiration~~arises~~. One solution to ~~the~~respiratory motions is selection or correction of data using a navigator echo produced by a navigation pulse incorporated in an imaging pulse sequence.

Please amend the paragraph beginning at page 6, line 26, as follows:

In general, in cases it is desired to quickly obtain T1-weighted images or PD (proton density)-weighted images, FE-system pulse sequences are superior to others. On the contrary, if T2-weighted images whose sensitivity for lesions is excellent, pulse sequences that ~~is~~are capable of acquiring a plurality of echo signals in response to one

excitation time~~or excitation~~ are effective, increasing efficiency in data acquisition. Particularly, for T2-weighted images whose TR or TE is elongated, the EPI or FSE method is preferable and allows ~~the~~total scanning time to be reduced and image artifacts to be suppressed.

Please amend the paragraph beginning at page 7, line 8, as follows:

However, on account of the fact that ~~the~~conventional T2-weighted images obtained with the EPI or FSE method is based on a multi-slice technique, a signal from blood inflowing into a certain slice to be imaged has already been saturated by the RF excitation for other slices. Hence this T2-weighted imaging provides blood signals of less intensities, being inappropriate for the depiction of flow of blood.

Please add the following new paragraph at page 79, between lines 4 and 5:

--Though the present embodiments have been put into practice with respect to the blood of a patient object, these imaging techniques can also be used to image cerebral spinal fluid (CSF) or other fluid moving within the object.